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Town of Stoney Creek Traffic Operations Study

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Town of Stoney Creek Traffic Operations Study

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Mr. A. Gretzinger, P. Eng.
Chairman
Technical Co-ordinating Committee
Town of Stoney Creek
777 Highway No. 8
Fruitland, Ontario
L0R 1L0

Dear Sir:

The accompanying report is submitted in accordance with our agreement with the Town of Stoney Creek, dated May 27th, 1980.

The report outlines our assessment of the potential areas for improvement in traffic operations along Centennial Parkway and in the Lake Avenue Drive/Mountain Avenue North area between King Street and Queenston Road. The recommendations include the provision of a continuous turning lane along Centennial Parkway and a proposal to reduce the impact of through traffic on the residential community particularly those living on Mountain Avenue North.

The cooperation and assistance provided throughout the project by the Technical Co-ordinating Committee and your staff has been very much appreciated. We will be available as appropriate to assist in the implementation of the recommendations.

Yours very truly,

L.D. Turvey, P. Eng.
Manager, Hamilton Operations

K.G. McLean, P. Eng.
Chief Traffic Engineer

KGM/LDT:lc

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LIST OF COMMITTEE MEMBERS

Mr. A. Gretzinger, P.Eng.	Chairman, Town Engineer, Town of Stoney Creek
Mr. Fred Lintack	Councillor, Town of Stoney Creek
Mr. H. Donnelly	Assistant to the Mun. Eng. Hamilton Dist., Ministry of Transportation and Communications
Mr. P.H. Leyland	Head Office, Traffic Engineering, Ministry of Transportation and Communications
Mr. F.E. Stickle	Central Regional Traffic, Ministry of Transportation and Communications
Mr. G. Wagenaar, P. Eng.	Secretary, Town of Stoney Creek

TECHNICAL MEMORANDUMS

During the course of the study a number of technical memorandums were prepared and reviewed by the Technical Co-ordinating Committee. These comprise the Technical Appendix to this report and are listed below:

Technical Memorandum No. 1 - Data Collection and Analysis

Technical Memorandum No. 2 - Problem Areas and Issues

Technical Memorandum No. 3 - Review of Techniques to Reduce the Volume and Speed of Traffic on Local Residential Streets

Technical Memorandum No. 4 - Improvement Proposals Lake Avenue Drive-Mountain Avenue North Area

Technical Memorandum No. 5 - Improvement Alternatives Centennial Parkway

1.0 INTRODUCTION AND SUMMARY

This report outlines the findings and recommendations of the Stoney Creek Traffic Operations Study. Supporting technical material is contained in the technical memoranda submitted and approved during the course of the investigations.

The study was directed by a Technical Co-ordinating Committee comprised of the representatives from the Town of Stoney Creek and the Ministry of Transportation and Communications listed on the foregoing page.

1.1 Introduction

This Traffic Operations Study was intended as a comprehensive assessment of the current operational characteristics and traffic volumes along Centennial Parkway and the Lake Avenue Drive/Mountain Avenue North area between King Street and Queenston Road. The major elements of the study were:

- The preparation of an operational plan to resolve the current problems on Centennial Parkway particularly as they relate to the many driveway entrances, the close proximity of intersections, and the turning movements from Centennial Parkway into Cardinal Newman High School. Included among these problems are the vehicular left turning movements at the three signalized intersections within the study section of Centennial Parkway.

- The development of an operational plan and proposals for treating the street system and the traffic movements in the Mountain Avenue North and Lake Avenue Drive area particularly as these problems relate to vehicular accidents, through traffic, and notably, through truck traffic.

Each of these aspects is dealt with in the following sections of the report. Specific findings and recommendations, together with the required action and

estimated cost, where applicable, are summarized in the remainder of this section.

Meetings were held with representatives of the local residents to obtain an appreciation of local issues and concerns. A public information meeting was held at the conclusion of the project to inform local residents of the findings and recommendations.

1.2 Summary of Findings

1. While there is no basis on which a particular level of service can be quantified in terms of street sections between signal controlled intersections in urban areas, it is apparent that the inevitable growth in traffic on Centennial Parkway should be provided for in terms of some form of improvement to accommodate left turning vehicles, northbound and southbound on Centennial Parkway, in a manner which will minimize the impact of these turning vehicles on through traffic.

2. The following excerpt from the "Mountain East-West North-South Corridor Study" Report provides the basic design criteria upon which any recommendations in this study should be developed

   "Based on the detailed system analysis, the traffic volumes on the parallel north - south arterials would be slightly below or equal to current traffic flows. This includes Kenilworth Avenue, Parkdale Avenue, Nash Road, and Centennial Parkway.

   As a result, no widenings of these arterials were assumed given the provision of a 6-lane freeway within the Red Hill Creek Valley.

   Therefore, given the provision of the new controlled access facility in the Red Hill Creek Valley the achievement of the assumed higher rate of public transit useage, no widening of Centennial is foreseen to be required up to a future Regional population of 550,000 residents."

3. Pedestrian safety was suggested as a major concern along Centennial Parkway between King Street and Queenston Road. Concern was also expressed regarding pedestrian crossings particularly at both major intersections - at King Street and at Queenston Road. The lack of a sidewalk on the east side of Centennial Parkway was cited as an area of concern.

A survey undertaken on June 13, 1980 indicated that, in the morning peak period from 7:00 a.m. to 10:00 a.m., only 28 pedestrians crossed Centennial Parkway at Randall Avenue and, in the evening peak period from 2:00 p.m. to 6:00 p.m., only 20 pedestrians crossed Centennial Parkway at Randall Avenue. A school crossing guard is provided at this location.

4. The operational plan for the study section along Centennial Parkway between Queenston Road and King Street should be based on maintaining consistency in the design for Centennial Parkway in the area.

The intersection at Centennial Parkway and Queenston Road is operating at or near capacity during the evening peak hour on specific phases. There is little scope to adjust the phasing of the traffic signals and the physical restrictions are severe. The only beneficial measure would be the addition of right turn lanes for the eastbound and southbound traffic.

The intersection at Centennial Parkway and King Street is currently under reconstruction as part of the King Street project being undertaken by the Region of Hamilton-Wentworth. When completed, this intersection should operate at a much higher level of service than has been experienced in the past.

In order for the operational plan for the study section of Centennial Parkway to be in balance with the existing Queenston Road and the planned King Street intersections, the focus of the improvements must be restricted to adequate provision for turning vehicles. Consideration of additional through traffic lanes is not appropriate.

5. At the intermediate intersections along Centennial Parkway, the predominant collision pattern is the rear-end collision. At Neil Avenue 5 of 10 have been rear-end collisions. At Felker Avenue 3 of 6 have been rear-end collisions. At Randall Avenue 6 of 8 have been rear-end collisions. The rear-end collisions at Randall Avenue can probably be attributed in large part to the presence of the traffic signals. It should be pointed out that the conditions at this intersection do not meet the prescribed warrants for traffic signals.

   At the intersections at Felker Avenue and at Neil Avenue the rear-end collisions might have been caused by vehicles slowing or stopping to make a left turn. Insufficient data are available from the information provided to draw any firm conclusions in this regard.

6. Six alternative operational plans for Centennial Parkway between Queenston Road and King Street were developed and compared. Based on a comprehensive assessment of these options, an alternative which offered the optimum tradeoff between traffic capacity, pedestrian and vehicular safety and cost was selected.

7. The traffic survey in the Lake Avenue Drive - Mountain Avenue North area indicated a significant amount of through traffic. On Lake Avenue Drive, the through traffic component is approximately 60 percent of the total traffic. On Mountain Avenue North, the through traffic component is approximately 35 percent of the total traffic. The volume of through truck traffic was found to be minimal.

   As Lake Avenue Drive provides a "collector" road function, and since it plays an important role in providing access and circulation within the neighbourhood, it is not considered viable to consider any form of control on this street to reduce the volume of through traffic and the speed of traffic. Further, these were not cited as issues during discussions with local residents.

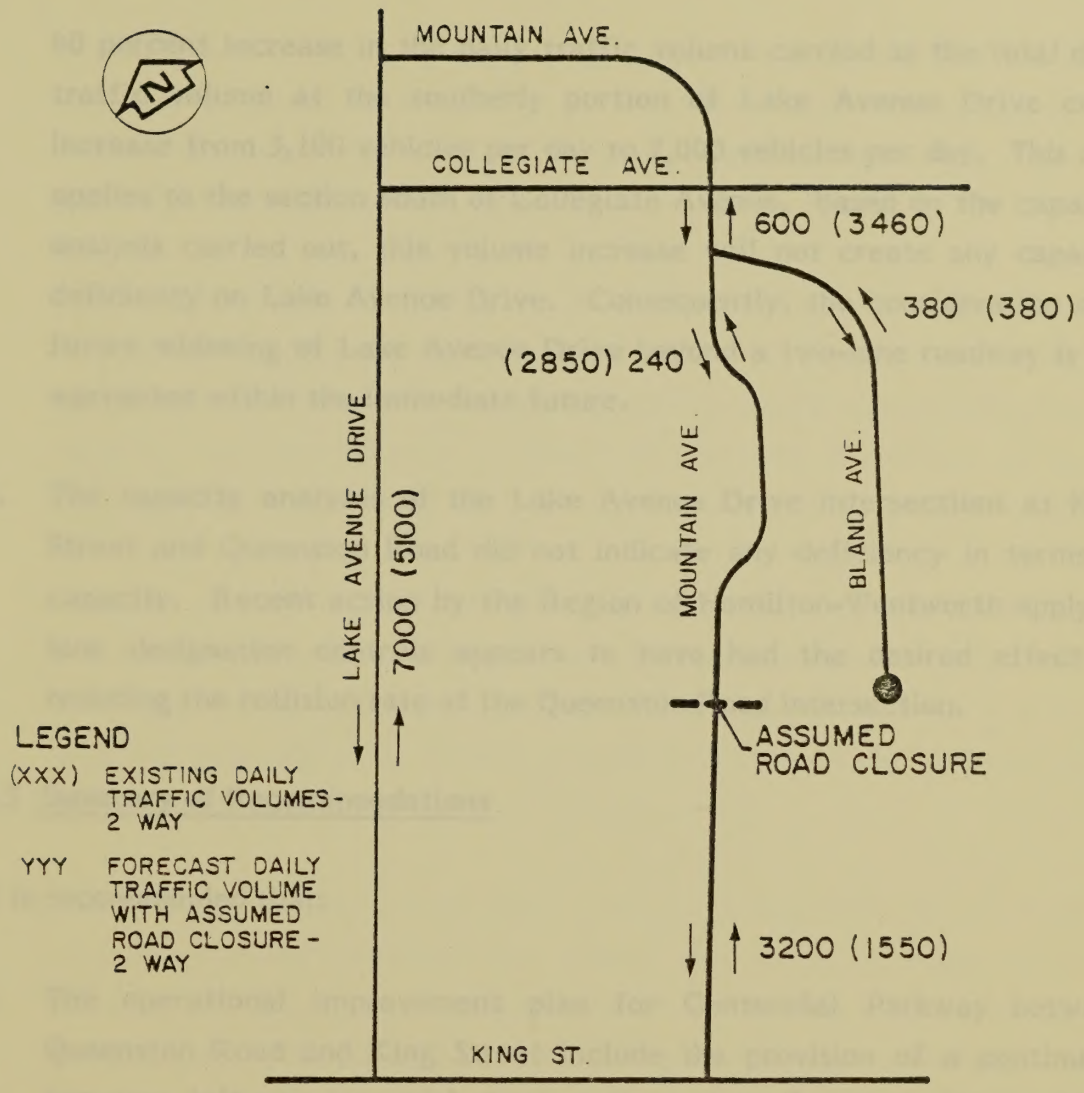
The present alignment of Mountain Avenue North does not provide an attractive through route for traffic. STOP signs have been in place on the Mountain Avenue approaches to Collegiate Avenue for some time. These measures in combination have not been effective in discouraging through traffic.

A road closure appears to be the only effective operational technique available to eliminate through traffic along Mountain Avenue North. Other operational measures would not be effective and would not successfully address the concerns of local residents regarding excessive speeds, property damage and pedestrian safety.

The logical location for such a road closure on Mountain Avenue North would be at the south limit of the single-family residential development. The proposed closure would be located just south of 41 Mountain Avenue North, approximately 300 m north of King Street, immediately north of the apartment complex. Regardless of the location, the design should allow for emergency vehicles to cross the portion of the road which is physically closed.

The traffic analyses carried out in this investigation confirmed Mountain Avenue would satisfy established criteria of other municipalities for the consideration of a road closure.

Under the assumption of a road closure on Mountain Avenue North between King Street and Collegiate Avenue, the estimated daily traffic volumes are forecast to be as indicated in the exhibit which follows. The present daily traffic volumes are indicated in parentheses.



The traffic on Mountain Avenue North north of the assumed closure is reduced by up to 90 percent. Traffic on Bland Avenue is unaffected. South of the possible closure, the total traffic increased slightly by 20 percent. All through traffic is removed.

After reviewing the origin - destination of the through traffic along Mountain Avenue North, it appears that virtually all of the through traffic along Mountain Avenue North will re-orient itself to Lake Avenue Drive. In addition, up to 50 percent of the generated traffic from the apartment complex, destined to the north, could also use Lake Avenue Drive. In summary, some sections of Lake Avenue Drive could experience up to a

40 percent increase in the daily traffic volume carried as the total daily traffic volume at the southerly portion of Lake Avenue Drive could increase from 5,100 vehicles per day to 7,000 vehicles per day. This only applies to the section south of Collegiate Avenue. Based on the capacity analysis carried out, this volume increase will not create any capacity deficiency on Lake Avenue Drive. Consequently, the consideration of a future widening of Lake Avenue Drive beyond a two-lane roadway is not warranted within the immediate future.

8. The capacity analyses of the Lake Avenue Drive intersections at King Street and Queenston Road did not indicate any deficiency in terms of capacity. Recent action by the Region of Hamilton-Wentworth applying lane designation controls appears to have had the desired effect of reducing the collision rate at the Queenston Road intersection.

1.3 Summary of Recommendations

It is recommended that:

1. The operational improvement plan for Centennial Parkway between Queenston Road and King Street include the provision of a continuous two-way, left-turn lane with short sections of median at the intersections at Neil Avenue, Felker Avenue and Randall Avenue. This fifth lane would be five metres in width retaining the present west curbline and effecting all widening on the east side of the right-of-way.

   The estimated improvement cost totals $212,000 including construction of a sidewalk along the east right-of-way. No property acquisition would be required.

Implementation of this option will provide a facility which is consistent with the Regional Municipality of Hamilton-Wentworth standards and which will serve the traffic demands expected within the five-year planning time frame of this study.

Further, with the reconstruction of the intersection of King Street and Centennial Parkway and the addition of right turn lanes for eastbound and southbound traffic at the intersection of Queenston Road and Centennial Parkway the improvement proposed will provide a standard of design consistent with that which has been applied north of Queenston Road.

With the provision of a 6-lane freeway within the Red Hill Creek Valley and the achievement of the assumed higher rate of public transit usage no furhter widening of Centennial Parkway will be required up to a future Regional population of 550,000 persons as stated in the Mountain East-West North-South Corridor Study Report.

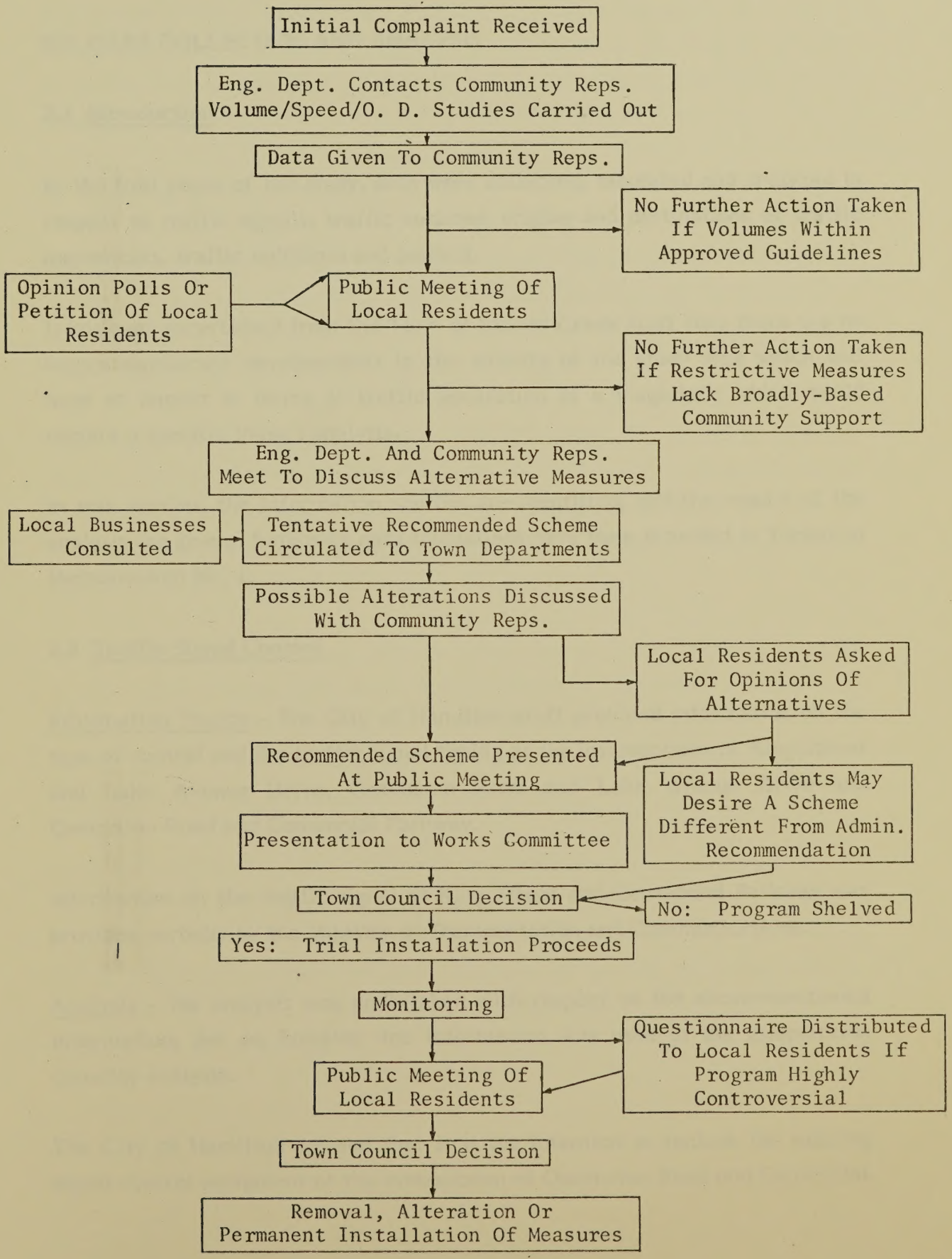
2. The Town of Stoney Creek adopt a policy to deal with requested street closures intended to reduce the volume and speed of traffic and thus enhance the safety and environment on residential streets within the municipality. The policy should include a procedure for processing and assessing such requests and proposals. A suggested procedure is provided in Table 1.

3. Subject to the adoption of a policy and associated procedures relating to proposals for road closures intended to reduce the volume and speed of traffic on residential streets, a road closure on Mountain Avenue North approximately 300 m north of King Street be proposed as a solution to the use of Mountain Avenue North by through traffic and thus enhance the environment and safety for those who live on and use Mountain Avenue North. Estimated construction cost for the road closure totals $10,000.

Table 1

COMPREHENSIVE ANTI-SHORTCUTTING

STUDY PROCESS


Initial Complaint Received
Eng. Dept. Contacts Community Reps. Volume/Speed/O. D. Studies Carried Out
Data Given To Community Reps.
No Further Action Taken If Volumes Within Approved Guidelines
Opinion Polls Or Petition Of Local Residents
Public Meeting Of Local Residents
No Further Action Taken If Restrictive Measures Lack Broadly-Based Community Support
Eng. Dept. And Community Reps. Meet To Discuss Alternative Measures
Local Businesses Consulted
Tentative Recommended Scheme Circulated To Town Departments
Possible Alterations Discussed With Community Reps.
Local Residents Asked For Opinions Of Alternatives
Recommended Scheme Presented At Public Meeting
Local Residents May Desire A Scheme Different From Admin. Recommendation
Presentation to Works Committee
Town Council Decision
No: Program Shelved
Yes: Trial Installation Proceeds
Monitoring
Questionnaire Distributed To Local Residents If Program Highly Controversial
Public Meeting Of Local Residents
Town Council Decision
Removal, Alteration Or Permanent Installation Of Measures

2.0 DATA COLLECTION AND ANALYSIS

2.1 Introduction

In the first phase of the study, data were collected, tabulated and analyzed in respect to traffic signals, traffic volumes, origins and destinations of traffic movements, traffic collisions and parking.

It has been ascertained from the Town of Stoney Creek staff that there are no known significant developments in the vicinity of the study area which will have an impact in terms of traffic generation of a magnitude which would require a specific impact analysis.

In this section, the information sources are identified, and the results of the analysis are given. Extensive data tabulations have been provided in Technical Memorandum No. 1.

2.2 Traffic Signal Control

Information Source - The City of Hamilton staff provided information on the type of control and the traffic signal timing at the intersections of King Street and Lake Avenue Drive, Queenston Road and Lake Avenue Drive and Queenston Road and Centennial Parkway.

Information on the traffic signal at King Street and Centennial Parkway was provided verbally by the Ministry of Transportation and Communications.

Analysis - No analysis was undertaken with respect to the above-mentioned information, per se, however the information was used in the intersection capacity analysis.

The City of Hamilton advised that it is the intention to replace the existing signal control equipment at the intersection of Queenston Road and Centennial

Parkway with a new solid-state, fixed-time controller this year. As well it is understood that, in conjunction with the construction of King Street, the control at the intersection of King Street and Centennial Parkway will be modified.

2.3 Intersection Traffic Volumes

Information Source - Intersection traffic volume data were obtained from two sources. Historical data were obtained from the City of Hamilton files. Current data collected as part of this study were obtained through surveys on Thursday, June 12, 1980 and Friday, June 13, 1980.

With respect to historical data, the City of Hamilton provided intersection turning volumes, where available for 1976 to 1979, for the intersections of Centennial Parkway and Queenston Road, Centennial Parkway and Randall Avenue, Centennial Parkway and King Street, Queenston Road and Lake Avenue Drive and King Street and Lake Avenue Drive.

As well, the City of Hamilton collected intersection turning movements at all of the above intersections with the exception of Centennial Parkway and Randall Avenue, at which Consultant staff collected data together with traffic turning movement information at all other intersections along Centennial Parkway between King Street and Queenston Road.

Analysis - The quality of traffic flow at an intersection is expressed as the "Level of Service" which ranges from A (best) to E (congested traffic conditions). Based on the representative traffic volumes, the traffic signal timing and the intersection geometrics, a capacity analysis was undertaken at each of the four major intersections within the study area and the results are presented in the following:

Intersection of Centennial Parkway and Queenston Road

In the morning peak period this intersection operates at Level B for the governing northbound traffic with the left-turn phase also operating at Level B. For the governing westbound traffic, the intersection operates at better than Level A.

In the evening peak, for the governing southbound traffic, the intersection operates at Level E, including the left-turn movement, while for the governing eastbound traffic volume the intersection operates between Level B and C with the left turn operating at Level E.

Centennial Parkway and King Street

This intersection has been analyzed on the basis of the proposed reconstruction of the intersection and an assumed 90-second cycle length. This current reconstruction is scheduled to be completed by the Region of Hamilton-Wentworth this year (1980).

Under these circumstances, the intersection can operate at Level A in the morning peak period and at Level B in the evening peak period with the westbound left turn operating at Level C.

Lake Avenue Drive and Queenston Road

In the morning peak period all approaches operate at better than Level A and in the evening peak period the southbound approach operates between Levels A and B, while other approaches operate at better than Level A.

King Street and Lake Avenue Drive

In the morning peak period all approaches operate at better than Level A and, as well, in the evening peak period all approaches operate at better than Level A.

2.4 Pedestrian Volumes

Information Source - During the traffic surveys on June 13, 1980, the number of pedestrians crossing Centennial Parkway in the study area was recorded.

Analysis - The locations at which the highest volumes of pedestrians were experienced are on Centennial Parkway at Felker Avenue and, to a lesser extent, on Centennial Parkway at Neil Avenue and at Randall Avenue.

2.5 Street Section Traffic Volumes

Information Source - The Consultant contracted with the City of Hamilton to provide automatic traffic recorders which were placed on Centennial Parkway south of Randall Avenue, on Lake Avenue Drive north of King Street and on Mountain Avenue North north of Jones Street.

These counters were in place from Wednesday, May 21 to Friday, June 13 inclusive and in the case of Centennial Parkway and Lake Avenue Drive, directional traffic volumes were recorded.

The City of Hamilton provided historical station traffic counts for a counting station location on King Street east of Lake Street for a one week period in 1978 and a one-week period in 1979.

Analysis - The corresponding traffic volumes derived from the manual intersection traffic counts were compared to the recorded one hour volumes. In this regard, the volumes compare reasonably well in most cases, the exception being the morning hour northbound on Centennial Parkway where there was a difference of 155 vehicles.

In the case of Centennial Parkway, the volumes recorded on Friday, June 13 are very close to the average for the morning hour and are slightly higher than the average for the evening hour. Generally the volumes are 10-15 percent below the peak volumes recorded during the survey period.

Similarly, on Lake Avenue Drive the volumes recorded on Thursday, June 12 are close to the average volumes for the survey period. However, they are as much as 20 percent below the peak volumes recorded in the survey period. The volumes are, however, relatively low and percentage variations translated into absolute numbers are not that significant.

It was not expected that the volumes would coincide exactly since the intersection traffic counts represent the maximum one-hour volume occurring at the intersection which is comprised of the four 15-minute periods experiencing the highest total intersection flow. Further, automatic traffic recorders tend to overcount by as much as 5 percent.

2.6 Origins and Destinations in the Lake Avenue Drive Area

Information Source - The Consultant staff, on June 12, 1980 between 7:00 a.m. and 10:00 a.m. and between 2:00 p.m. and 6:00 p.m., recorded the time and license plate information related to each vehicle which entered and left the area which included Lake Avenue Drive and Mountain Avenue North in order to determine the number of vehicles which merely passed through the area and those which originated in the area or were destined for the area.

Analysis of Information - In the morning period approximately one-half of the 1,410 vehicles leaving the area were "through" vehicles and, of the through vehicles, 62 percent were on Lake Avenue Drive.

In the evening period, approximately one-half of the 3,034 vehicles entering the area were through vehicles and, of the through vehicles, 64 percent were on Lake Avenue Drive.

With respect to the heavy vehicle movements, the number of such vehicles travelling through the area was negligible - 3 in the morning peak period and 1 in the evening peak period.

2.7 Collision Data

Information Source - The City of Hamilton stores information from reports prepared by the Hamilton Wentworth Police Force on all reportable traffic collisions.

The City uses computer programs to extract relevant data in summary form. For the purpose of this study, the City provided tabulations of collision data for the years 1977, 1978, 1979 and 1980 (to mid-June) for Centennial Parkway and for the area in the vicinity of Lake Avenue Drive and Mountain Avenue North.

Through discussions with members of the public, the Consultant was advised of a number of unreported accidents occurring along Mountain Avenue North. These accidents, although not involving personal injury, are apparently creating substantial property damage.

Further, at Technical Co-ordinating Committee meetings the Consultant was advised of problems associated with heavy trucks travelling northbound on Highway 20 approaching King Street. These vehicles which travel down a long grade are, according to comments provided, experiencing some difficulties at this location. This matter is to be reviewed by the staff of the Ministry of Transportation and Communications.

Analysis of Information - Collision rates have been calculated for each of the four above-mentioned intersections since a rate is a much better indicator of the relative seriousness of a situation within a group of intersections.

The rate is expressed in terms of collisions per million entering vehicles. A figure for the annual number of entering vehicles is derived by using the historical intersection counts provided by the City of Hamilton which include a factor for converting the actual count to an average daily traffic and multiplying the converted figure by 365 to develop an estimate of the annual number of entering vehicles. The number of recorded intersection collisions is presented in Table 2.

The rates as determined by dividing the number of recorded collisions each year by the number of entering vehicles are presented in Table 3.

Table 2

INTERSECTION COLLISIONS

(includes all collisions within 33 m of the intersection)

	1977	1978	1979	1980 to date
Queenston/Centennial	43	26	34	13
King/Centennial	16	17	23	8
Lake/Queenston	25	16	13	4
Lake/King	8	9	4	1

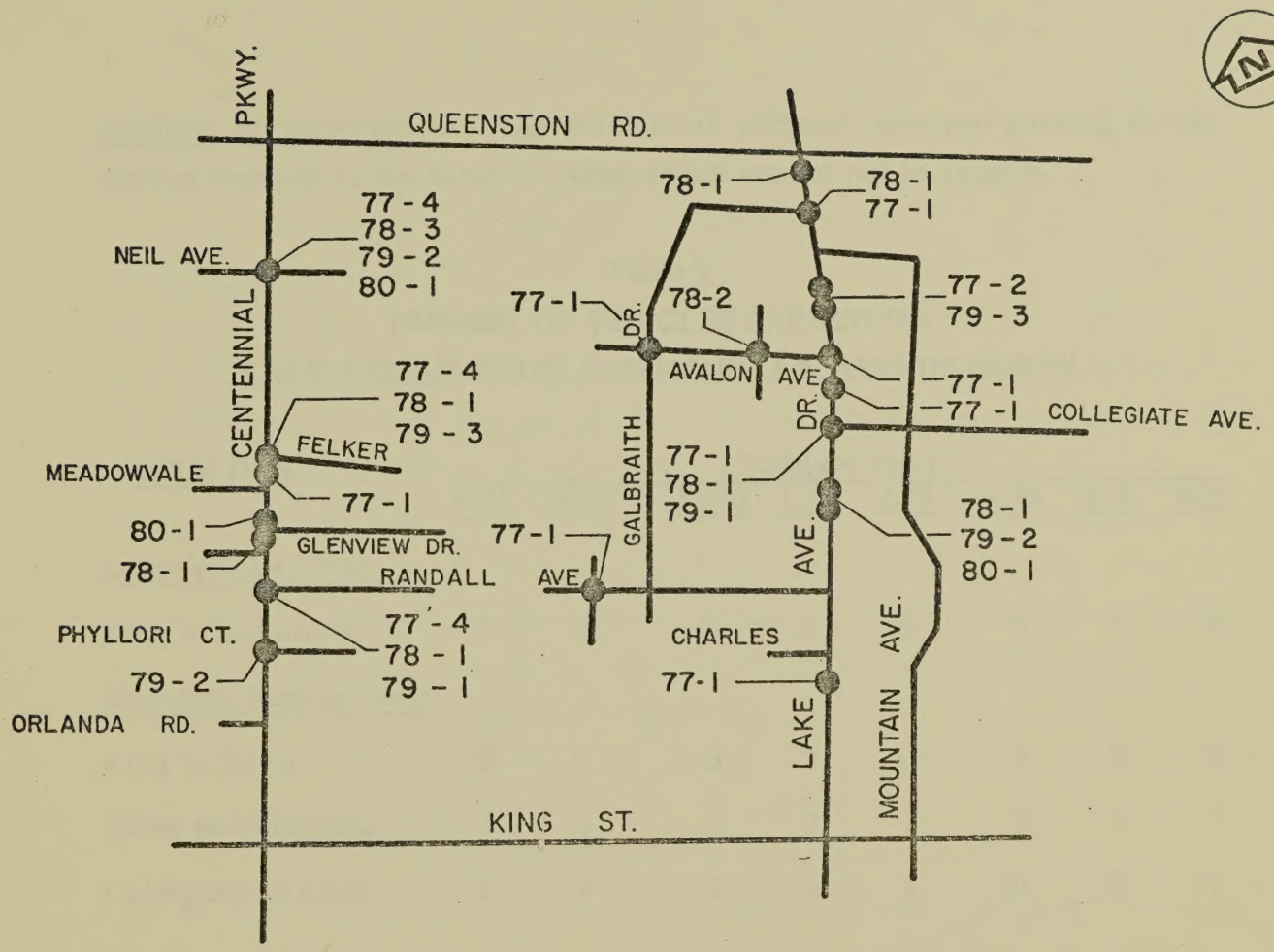
Since the traffic volume data available for 1977 are incomplete and since the period for which accident data are available in 1980 is undefined, Table 3 contains information related to 1978 and 1979 only.

Table 3

INTERSECTION COLLISION RATES

	1978	1979
Queenston/Centennial	1.50	1.79
King/Centennial	1.24	1.76
Lake/Queenston	1.55	1.35
Lake/King	1.32	0.59

Set out on the following page is a map of the area depicting the number of traffic collisions which have occurred at other locations on Centennial Parkway and on Lake Avenue Drive and adjacent streets.



TRAFFIC COLLISIONS 1977-1980 (TO JUNE)

2.8 Parking

Information Source - The Consultant staff, on June 12, 1980, recorded observations of the number of vehicles parked on sections of Lake Avenue Drive and Mountain Avenue North at various points in time throughout the day.

Since parking is prohibited on both sides of Lake Avenue Drive throughout its length and on both sides of Mountain Avenue North from King Street to Collegiate Avenue, the results of the survey gave an indication of the extent to which the parking regulations are violated.

Analysis of Information - The number of vehicles observed parking in the various sections at the times of observations are set out in Table 4.

Table 4

NUMBER OF VEHICLES PARKED ON

LAKE AVENUE DRIVE AND MOUNTAIN AVENUE NORTH

LOCATION	TIME OF DAY							
	8:30	9:30	11:00	1:30	2:30	4:30	8:30	6:30
Lake Avenue Drive								
King to Galbraith	0	0	0	0	0	0	0	0
Mountain Avenue North								
King to Jones	0	0	0	0	0	0	0	0
Jones to Collegiate	3	0	3	2	1	2	4	7
Collegiate to Lake	6	4	3	6	5	10	12	11

It is apparent that during the period of the survey compliance with the parking regulations is excellent on Lake Avenue Drive however there were violations of the regulations on Mountain Avenue North between Jones Street and Collegiate Avenue.

3.0 IMPROVEMENT ALTERNATIVES - CENTENNIAL PARKWAY

3.1 Introduction

Based on the analyses of the data collected in the initial phase of the project, the operational plan for Centennial Parkway must provide for consistency, in terms of design, with the other sections of Centennial Parkway in the area and must also be in balance with the capacities of the signalized intersections at the terminal points at each end of the study section. As a result, consideration of additional through traffic lanes is not appropriate. The focus of the alternative improvements is restricted to adequate provision for turning vehicles.

3.2 Improvement Alternatives

Six alternatives for the improvement of Centennial Parkway between Queenston Road and King Street were formulated and evaluated. These were:

(1) Channelization at intersections

(2) Provision of a continuous raised median

(3A) Provision of a continuous two-way, left-turn lane five metres in width centered within the existing right-of-way.

(3B) Provision of a continuous two-way, left-turn lane five metres in width retaining the present west curb line and effecting all widening on the east side of the right-of-way.

(4A) Provision of a continuous two-way, left-turn lane 3.5 metres in width centered within the existing right-of-way.

(4B) **Provision of a continuous two-way, left-turn lane 3.5 metres in width retaining the present west curb line and effecting all widening on the east side of the right-of-way.**

The factors associated with each of these alternatives for improving the traffic operations and safety on Centennial Parkway from Queenston Road to King Street are described in the following:

Alternative 1 - Channelization at Intersections

This alternative involves the channelization of the intersections, including the provision of a left-turn bay at Neil Avenue, at Felker Avenue/High School Driveway and at Randall Avenue.

Factors

(a) Increases the through and turning traffic capacity on Centennial Parkway.

(b) Improves the vehicular traffic operations and safety at the channelized intersections with no change in the present operations at other intersections nor at mid-block locations where there are private driveways.

(c) Provides an improved measure of safety because of the provision of left-turn bays and refuge areas for pedestrians crossing Centennial Parkway.

(d) Access to some of the premises and local streets in the immediate vicinity of the channelized intersections will be restricted because of the raised islands.

(e) Emergency vehicle access to premises in the vicinity of the channelized intersections would be restricted.

(f) Delays to through traffic would be reduced through the sections with the channelized intersections.

(g) Results in an irregular alignment of the east and west curbs as a consequence of the variations in the pavement width to accommodate the raised medians at the intersections.

Alternative 2 - Continuous Raised Median

The second improvement option consists of the provision of a continuous raised median from Queenston Road to King Street. The median would be 5.0 metres wide and reduced to 1.4 metres at intersections in order to accommodate left turn lanes. Median openings would be provided at the intersections at:

- Neil Avenue
- Felker Avenue/High School Driveway
- Randall Avenue

Factors

(a) Provides increased traffic capacity for both through and turning traffic.

(b) Provides optimum safety from an operational viewpoint since opposing traffic streams are physically separated, all left turn movements at private driveways are eliminated, all intersections are channelized with left turn lanes.

(c) Pedestrian safety is enhanced significantly through the provision of pedestrian refuge areas in the middle of the road along the entire section.

(d) Access via left turn movement to all premises and to all local streets along Centennial Parkway at which no median opening is provided is eliminated for each traffic direction with the resulting adverse impact.

This is particularly a concern because of the number of 'dead end' streets connected to Centennial Parkway in this area.

(e) Emergency vehicle access to premises in the area will be impeded.

(f) Delays to through traffic on Centennial Parkway would be reduced significantly.

(g) Depending upon the location of the roadway within the existing right-of-way there may or may not be a requirement to relocate the existing sidewalk and curb on the west side of the roadway.

Alternative 3A - Continuous Two-Way, Left-Turn Lane 5 Metres in Width, Centered Within the Existing Right-of-Way

The third improvement option is the provision of a fifth lane which would act as a continuous two-way, left-turn lane. The fifth lane would be 5.0 metres wide. Widening would take place equally on both sides of the present roadway. The width would allow for the channelization of intersections as proposed under Alternative 1 and the provision of the associated left-turn lanes although with much less restrictive features (i.e. the length of the raised median at an intersection would be considerably shorter than it would be in Alternative 1. In fact, channelization at intersections would be optional in this alternative.) In mid-block sections, the fifth lane would be utilized by vehicles entering or leaving the various driveways and local street intersections located along Centennial Parkway.

Factors

(a) Increases the through and turning traffic capacity along Centennial Parkway.

(b) Improves vehicular traffic operations and safety between intersections.

(c) Creates a wide expanse of pavement for pedestrians to cross from one side of the roadway to the other except at locations at which there are median islands which provide a pedestrian refuge area.

(d) Allows direct access from both traffic directions to the premises and local intersections except those in the vicinity of channelized intersections. Access via left turn movement to those premises and local street intersections in the immediate vicinity of channelized intersections will be slightly affected if raised median islands are provided.

(e) Emergency vehicle access to premises would be affected only if raised medians were to be provided and even under these circumstances such areas would be affected only minimally.

(f) Reduces delays to through traffic.

(g) Unfamiliarity with a fifth lane operation may create some difficulties during the initial period of operation.

(h) Overhead signs will be required as well as additional pavement markings.

(i) The provision of a five metre width for the two way left turn lane complies with the standards of the Regional Municipality of Hamilton Wentworth and allows for the future development of a raised median between Queenston Road and King Street should conditions warrant such action in the future.

(j) Allows for boulevards between the edge of the roadway and the sidewalks of equal width (minimum of three metres) on each side of Centennial Parkway and allows for a separation of one metre between the abutting property line and the near edge of the sidewalk on each side of the road. Under this alternative the sidewalk on the west side of Centennial Parkway would have to be relocated.

(k) The estimated cost of implementing this scheme is $305,000 plus $7,000 if raised medians are provided.

Alternative 3B - Continuous Two-Way, Left-Turn Lane 5 Metres in Width, Retaining the Present West Curb Line and Affecting all Widening on the East Side of the Right-of-Way

The fourth improvement option is the provision of a fifth lane which would act as a continuous two-way, left-turn lane. The fifth lane would be 5.0 metres wide. Widening would take place only on the east side of the roadway. The width would allow for the channelization of intersections as proposed under Alternative 1 and the provision of the associated left-turn lanes although with much less restrictive features (i.e. the length of the raised median at an intersection would be considerably shorter than it would be in Alternative 1. In fact, channelization at intersections would be optional in this alternative). In mid-block sections, the fifth lane would be utilized by vehicles entering or leaving the various driveways and local street intersections located along Centennial Parkway.

Factors

(a) Increases the through and turning traffic capacity along Centennial Parkway.

(b) Improves vehicular traffic operations and safety between intersections.

(c) Creates a wide expanse of pavement for pedestrians to cross from one side of the roadway to the other except at locations at which there are median islands which provide a pedestrian refuge area.

(d) Allows direct access from both traffic directions to the premises and local intersections except those in the vicinity of channelized intersections. Access via left-turn movement to those premises and local street intersections in the immediate vicinity of channelized intersections will be slightly affected if raised median islands are provided.

(e) Emergency vehicle access to premises would be affected only if raised medians were to be provided and even under these circumstances such areas would be affected only minimally.

(f) Reduces delays to through traffic.

(g) Unfamiliarity with a fifth lane operation may create some difficulties during the initial period of operation.

(h) Overhead signs will be required as well as additional pavement markings.

(i) The provision of a five metre width for the two-way, left-turn lane complies with the standards of the Regional Municipality of Hamilton-Wentworth and allows for the future development of a raised median between Queenston Road and King Street should conditions warrant such action in the future.

(j) Allows for the retention of the existing sidewalk and boulevard on the west side of the roadway and allows for a boulevard of 1.5 to 2 m in width on the east side of Centennial Parkway with a separation of 0.5 metres (approximately) between the abutting property line and the near edge of the sidewalk.

(k) The estimated cost of implementing this scheme is $205,000 plus $7,000 is raised medians are provided.

Alternative 4A - Continuous Two-Way, Left-Turn Lane 3.5 Metres in Width, Centred Within the Existing Right-of-Way

The fifth improvement option is the provision of a fifth lane which would act as a continuous two-way, left-turn lane. The fifth lane would be 3.5 metres wide. Widening would take place equally on both sides of the present roadway. In mid-block sections, the fifth lane would be utilized by vehicles entering or

leaving the various driveways and local street intersections located along Centennial Parkway.

Factors

(a) Increases the through and turning traffic capacity along Centennial Parkway; however, likely not as much as with Alternatives 3A and 3B.

(b) Improves vehicular traffic operations and safety between intersections; however, when two vehicles enter the fifth lane in the same section and must pass to reach the points at which the left turn is to be made, one of the vehicles must leave the fifth lane and re-enter a through lane.

(c) Creates a wide expanse of pavement for pedestrians to cross from one side of the roadway to the other, which will likely require the installation of traffic signals at some location in the future as a consequence of these problems.

(d) Allows direct access from both traffic directions to all premises and local intersections.

(e) Emergency vehicle access to premises in the area is unimpeded.

(f) Reduces delays to through traffic with slightly less benefit than in Alternatives 3A and 3B.

(g) Unfamiliarity with a fifth lane operation may create some difficulties during the initial period of operation, likely to a greater extent than would be the case in Alternatives 3A and 3B.

(h) Overhead signs will be required as well as additional pavement markings.

(i) The provision of a 3.5 metre width for the two-way, left-turn lane does not comply with the standards of the Regional Municipality of Hamilton-

Wentworth, and the future development of a raised median between Queenston Road and King Street (should conditions warrant such action) would be costly.

(j) Allows for boulevards between the edge of the roadway and the sidewalks on each side of Centennial Parkway. The sidewalk on the west side of the roadway can be retained; however, the boulevard on this side would be reduced to as little as 1.0 metres to 1.5 metres in some places. A boulevard with a minimum width of 3 metres can be provided on the east side of the roadway. This alternative also allows for a separation of one metre between the abutting property line and the near edge of the sidewalk on each side of the road.

(k) The estimated cost of implementing this scheme is $230,000. However, if a new sidewalk is to be provided on the west side the cost would be $270,000.

Alternative 4B - Continuous Two-Way, Left-Turn Lane 3.5 Metres in Width, Retaining the Present West Curb Line and Effecting All Widening on the East Side of the Right-of-Way

The sixth improvement option is the provision of a fifth lane which would act as a continuous two-way, left-turn lane. The fifth lane would be 3.5 metres wide. Widening would take place only on the east side of the roadway. In mid-block sections, the fifth lane would be utilized by vehicles entering or leaving the various driveways and local street intersections located along Centennial Parkway.

Factors

(a) Increases the through and turning traffic capacity along Centennial Parkway; however, likely not as much as with Alternatives 3A and 3B.

(b) Improves vehicular traffic operations and safety between intersections; however, when two vehicles enter the fifth lane in the same section and

must pass to reach the points at which the left turn is to be made, one of the vehicles must leave the fifth lane and re-enter a through lane.

(c) Creates a wide expanse of pavement for pedestrians to cross from one side of the roadway to the other which will likely require the installation of traffic signals at some location in the future as a consequence of these problems.

(d) Allows direct access from both traffic directions to all premises and local intersections.

(e) Emergency vehicle access to premises in the area is unimpeded.

(f) Reduces delays to through traffic with slightly less benefit than in Alternatives 3A and 3B.

(g) Unfamiliarity with a fifth lane operation may create some difficulties during the initial period of operation, likely to a greater extent than would be the case in Alternatives 3A and 3B.

(h) Overhead signs will be required as well as additional pavement markings.

(i) The provision of a 3.5 metre width for the two-way, left-turn lane does not comply with the standards of the Regional Municipality of Hamilton-Wentworth, and the future development of a raised median between Queenston Road and King Street (should conditions warrant such action) would be costly.

(j) Allows for boulevards between the edge of the roadway and the sidewalks on each side of Centennial Parkway. The sidewalk on the west side of Centennial Parkway can be retained under this alternative; however, the boulevard on this side would be reduced to approximately

2.0 metres. This alternative also allows for a separation of one metre between the abutting property line and the near edge of the sidewalk on each side of the road.

(k) The estimated cost of implementing this scheme is $175,000.

3.3 Conclusion

Based on the factors enumerated in the foregoing, it is proposed that Alternative 3B, with medians provided at Neil Avenue at Felker Avenue/High School Driveway and at Randall Avenue, be selected for implementation. The removal of the traffic signal at Centennial Parkway and Randall Avenue should be considered in the design phase of the implementation of this alternative. It is the Consultant's view that this alternative best combines the relevant benefits to traffic capacity, pedestrian and vehicular safety with cost although it is recognized that there are some disadvantages associated with access to four premises along the study section.

Implementation of Alternative 3B would provide a facility which is consistent with the Regional Municipality of Hamilton Wentworth standards and which will serve the traffic demands which will be experienced within the time frame of this study.

4.0 IMPROVEMENT PROPOSAL
LAKE AVENUE/MOUNTAIN DRIVE NORTH AREA

4.1 Introduction

To address the issue of the need for some means to control the use of Mountain Avenue North by vehicular traffic, the various techniques which might be considered in attempting to reduce the volume and speed of traffic on local residential streets are identified, and the basis for consideration of a street closure on Mountain Avenue North are discussed in this section of the report.

4.2 Alternative Techniques

The "conventional" techniques proved to be effective in controlling the speed of vehicles and the use of local streets by traffic using the local street as a "short-cut" are outlined below. This discussion is based on a recent paper prepared by the City of Calgary Transportation Department.

(i) Speed Bumps and Rumble Strips

Most available evidence indicates that these devices are not appropriate for speed or volume control on public roads. Bumps high enough to physically cause motorists to reduce their speed would create potential liability problems and are dangerous for cyclists and emergency vehicles. Rumble strips have marginal impacts on residential traffic speeds and volumes, while creating noise and vibration problems for adjacent residences.

(ii) Traffic Circles or Buttons

Small raised traffic circles at intersections of residential streets intended to reduce traffic speeds and/or volumes have generally been marginal in their effectiveness. Vehicles wishing to proceed straight through such an intersection must make sharp right and left turns. Although intersection

speeds decrease somewhat, vehicles accelerate quickly after passing the circles.

(iii) Road Narrowings

Narrowings of residential roadways have proven to have little impact on traffic speeds or volumes while creating several operational and safety problems. The intent of these road narrowings is to cause motorists to drive more slowly due to the constricted roadway width.

(iv) STOP Signs

The experience with the use of STOP signs, particularly four-way STOP signs, as deterrents to residential speeding and/or short-cutting is poor. Four-way STOP signs are neither an effective nor appropriate restrictive technique. Given that the STOP sign is the most important fundamental traffic control device in use, it is critical from the perspectives of safety and respect for the law that unwarranted STOP signs not be allowed to proliferate.

(v) One-Way Streets

One-way streets have been tried as a means of restricting outside traffic from using local residential streets. In certain circumstances the technique has been quite effective, particularly where a maze of single block one-way sections has been created. However, short one-way sections used in isolation have generally not proven effective. Safety hazards, increased speeds, lack of motorist compliance and inconvenience for local residents are all potential drawbacks of one-way residential streets.

(vi) Signed Turn or Entry Prohibitions

Signs establishing turn or entry restrictions are one of the easiest and least expensive anti-short-cutting techniques to implement. However, frequent and expensive police enforcement is required to maintain motorist compliance with these signed restrictions. Enforcement cannot take place on a regular

basis, and this becomes increasingly true as the number of these signed restrictions increases. Consequently, high rates of motorist non-compliance have been recorded and these lead toward an increased lack of respect for restrictive traffic signs in general.

(vii) Road Closures and Diverters

Diverters and channelization have both been used and found to be effective deterrents to short-cutting traffic. Once installed, they require little enforcement. Unfortunately, these measures can drastically alter established local travel patterns in addition to reducing short-cutting traffic volumes. Therefore, their installation is often highly controversial. Due to the potential impact of these measures on local, emergency and service vehicle trips, and the significant capital cost of permanent installations, potential locations should be studied very carefully, and implementation recommended only after clear community support has been documented.

(viii) Arterial Improvements

A lack of capacity and a low level of service on the major road network is the fundamental cause of most short-cutting. Arterial improvements, therefore, are the most effective means of reducing through traffic volumes on residential streets. Restrictive measures on local streets, where appropriate, should be implemented in conjunction with improvements to adjacent arterial roads.

(ix) Other Measures

Other measures which have been tried are peak period barriers and "Bus Only" crossings. Barriers which rise at regular intervals or which block residential streets for certain hours each day are not considered appropriate. "Bus Only" crossings are an effective measure in newly developing areas for restricting undesirable traffic patterns while allowing convenient bus service. However, there are certain problems associated with the use of these special bus crossings, and they should generally not be placed on currently open roads.

A summary of the restrictive measures which have been tried in different municipalities and those that have been recommended by the municipal officials in those municipalities is provided in Table 5 on the following page.

Based on the preceding information, the options to address the issues related to the amount of through traffic on Mountain Avenue North focus on the viability of a street closure. It is believed that no less-restrictive measures are available to satisfactorily resolve the issue.

The logical location for such a road closure on Mountain Avenue North would be at the south limit of the single-family residential development. The proposed closure would be located just south of 41 Mountain Avenue North, approximately 300 m north of King Street, immediately north of the apartment complex. Regardless of the location, the design should allow for emergency vehicles to cross the portion of the road which is physically closed.

4.3 Evaluation Criteria

Criteria and procedures for residential street closures have been developed by some municipalities, one of which is the City of Hamilton. The City of Calgary has also developed procedures and criteria for assessing the need and form of control which should be considered in dealing with "short-cutting" problems. The Calgary criteria in terms of traffic volumes include the following:

- In addition to the maximum acceptable traffic volumes on residential streets of approximately 1,000 vehicles per day the proposed guideline is approximately 200 vehicles per peak hour. These maximum traffic volumes are approximate guidelines only. Because a particular residential street has volumes in excess of 1,000 vehicles per day or 200 per hour, restrictive measures will not necessarily be undertaken.

Table 5

RESTRICTIVE MEASURES TRIED AND/OR RECOMMENDED

METHOD / CITY	SPEED BUMPS & RUMBLE STRIPS		TRAFFIC CIRCLES OR "BUTTONS"		ROAD NARROWINGS		STOP SIGNS		ONE-WAY STREETS		ARTERIAL IMPROVEMENTS		SIGNED TURN/ ENTRY PROHIBIT		ROAD CLOSURES DIVERTERS, ETC.		COMPREHENSIVE PROGRAMS	
	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M	TRIED	REC'M
EDMONTON							X		X	X	X	X	X	X	X	X	X	X
HAMILTON							X	X	X	X	X	X	X		X		X	X
LONDON							X		X				X		X	X		
MONTREAL							X		X	X			X		X	X		
OTTAWA/ CARLETON	X				X		X		X		X	X	X		X	X	X	X
PORTLAND							X		X		X	X			X	X		
QUEBEC							X		X	X	X	X	X					
REGINA			X						X	X	X	X			X	X		
SEATTLE			X	X					X		X	X	X		X	X	X	X
TORONTO	X		X				X		X		X	X	X	X	X			
VANCOUVER	X				X		X				X	X	X	X	X	X	X	X
WINDSOR	X		X		X		X		X	X	X	X	X	X	X			
WINNIPEG							X						X		X			
CALGARY	X						X		X		X	X	X		X	X	X	X
TOTALS	5	0	4	1	3	0	12	1	12	6	11	11	12	4	13	9	6	6

- Only under highly exceptional circumstances will any restrictive measures be considered on local residential streets with traffic volumes under the above levels, or on collector roadways with less than approximately 5,000 vehicles per day (10,000 per day on a primary collector).

The City of Hamilton criteria are presented below together with comments with reference to Mountain Avenue North.

(a) **The street under consideration is not an "arterial" or "collector" street.**
Mountain Avenue North is intended as a "local" street which is required solely to provide access to abutting residential properties.

(b) **The portion of the street under consideration does not provide a "vital function" of access to or circulation within the neighbourhood.**
Bland Avenue is the only local street dependent on Mountain Avenue North for access to the abutting street system. With a possible closing of Mountain Avenue North between Bland Avenue and King Street, access to and from the south for the Bland Avenue residents would be affected; however, the out-of-the-way travel for the Bland Avenue residents would be minimal due to the close proximity of Lake Avenue Drive.

(c) **The street is not required as a public transit route.**
Based on the recent study of the local transit system in Stoney Creek, the use of Mountain Avenue North is not foreseen as a public transit route.

(d) **An adequate turn-around area may be constructed at the proposed point of closure.**
The construction of an adequate turn-around area will require acquisition of property to provide adequate manoeuvring for garbage trucks and snow removal vehicles. The present 66-foot road allowance would be sufficient to provide for passenger cars.

(e) **Less-restrictive measures are not available to solve the alleged problems.**

The present alignment of Mountain Avenue North does not provide an attractive through route for traffic. STOP signs have been in place on Mountain Avenue North approaches to Collegiate Avenue for some time. These measures in combination have not been effective in discouraging through traffic.

In addition, other operational methods would not appear to be effective in addressing the concerns of the abutting residents regarding excessive operating speeds, property damage, and pedestrian safety.

Based on the above, Mountain Avenue North satisfies these initial criteria for consideration of a road closure. Further traffic analysis, using the results of the recent traffic surveys, were used to assess the benefits in relation to the remaining guidelines listed below:

(f) **The existing volume of through traffic on a typical weekday is a minimum of:**

- **300 vehicles per day, or**
- **30 vehicles in the peak hour, or**
- **20 percent of the total daily traffic volume, or**
- **20 percent of the peak hour total volume, whichever is the least.**

The through traffic volumes on Mountain Avenue North were recorded as being 251 for the 7-hour survey period and 183 in the 4-hour p.m. peak period. In all periods, the through traffic volumes exceeded 20 percent of the total traffic recorded.

(g) **The effect of the closure is not to simply shift the original volume of through traffic to other similar residential streets in the same or adjoining neighbourhoods.**

The traffic on Mountain Avenue North of the possible closure is reduced by up to 90 percent. Traffic on Bland Avenue is unaffected. South of

the possible closure, the total traffic increased slightly by 20 percent. All through traffic is removed.

After reviewing the origin - destination of the through traffic along Mountain Avenue North, it appears that virtually all of the through traffic along Mountain Avenue North will re-orient itself to Lake Avenue Drive. In addition, up to 50 percent of the generated traffic from the apartment complex, destined to the north, could also use Lake Avenue Drive. In summary, some sections of Lake Avenue Drive could experience up to a 40 percent increase in the daily traffic volume carried. This only applies to the section south of Collegiate Avenue. The total daily traffic volume at the sourtherly portion of Lake Avenue Drive could increase from 5,100 vehicles per day to 7,000 vehicles per day. Based on the capacity analysis carried out, this volume increase will not create any capacity deficiency on Lake Avenue Drive. As a result, there is no need to consider widening Lake Avenue Drive within the short-term planning period other than to provide for a standard road width of two lanes with parking prohibited on both sides of the road.

In addition there must be broad community support as reflected in the final criterion:

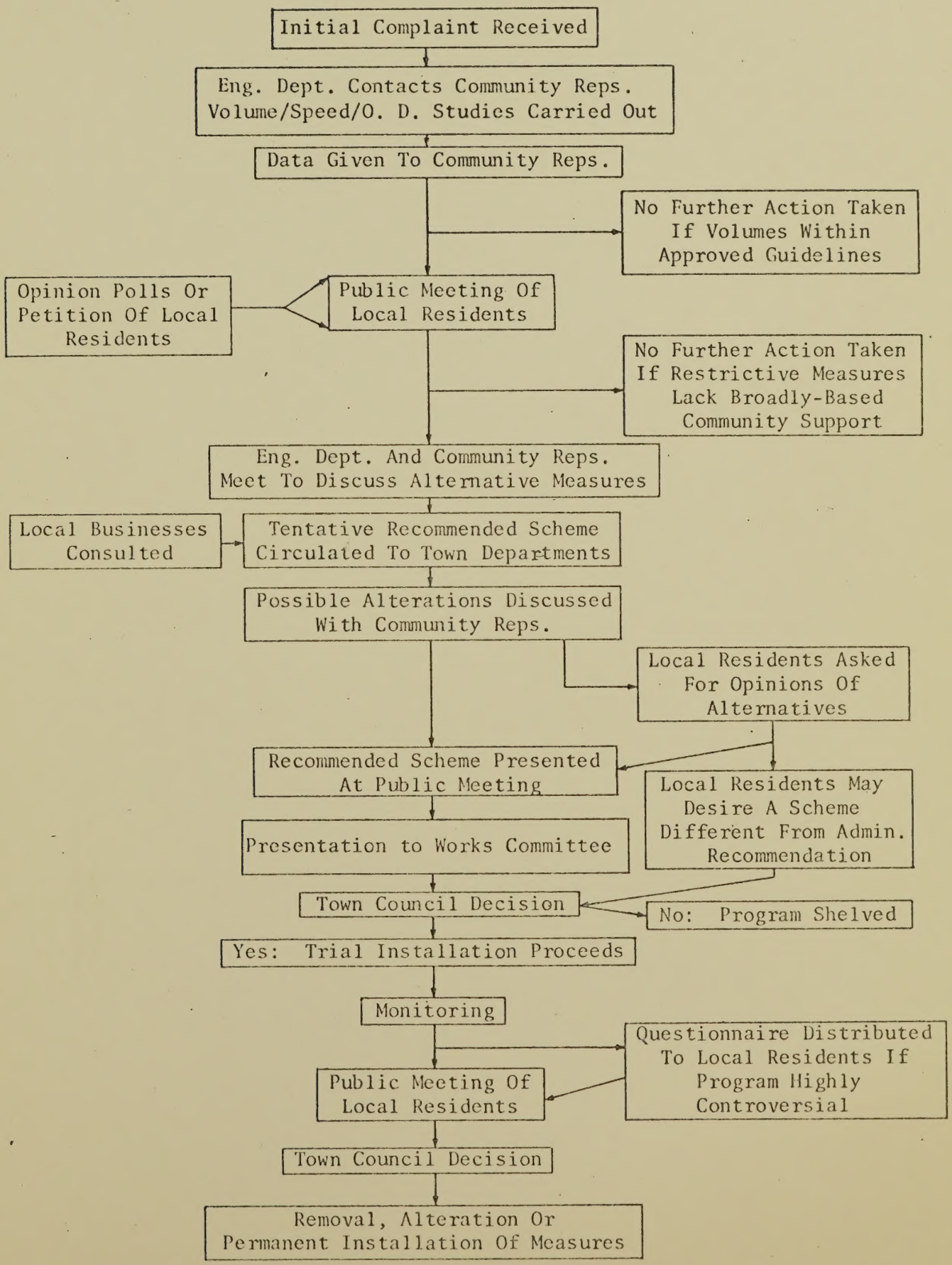
(h) **A minimum of 2/3 of all owners or tenants within the neighbourhood, responding to the questionnaire, should be in favour of a permanent street closure.**

Based on the experience in other municipalities, it is essential that a procedure be adopted which will allow the local residents to express their opinion on any proposal to close Mountain Avenue North. A suggested procedure is illustrated in Table 1. This is based on a procedure developed by the City of Calgary.

Table 1

COMPREHENSIVE ANTI-SHORTCUTTING

STUDY PROCESS


Initial Complaint Received
Eng. Dept. Contacts Community Reps. Volume/Speed/O. D. Studies Carried Out
Data Given To Community Reps.
No Further Action Taken If Volumes Within Approved Guidelines
Opinion Polls Or Petition Of Local Residents
Public Meeting Of Local Residents
No Further Action Taken If Restrictive Measures Lack Broadly-Based Community Support
Eng. Dept. And Community Reps. Meet To Discuss Alternative Measures
Local Businesses Consulted
Tentative Recommended Scheme Circulated To Town Departments
Possible Alterations Discussed With Community Reps.
Local Residents Asked For Opinions Of Alternatives
Recommended Scheme Presented At Public Meeting
Local Residents May Desire A Scheme Different From Admin. Recommendation
Presentation to Works Committee
Town Council Decision
No: Program Shelved
Yes: Trial Installation Proceeds
Monitoring
Questionnaire Distributed To Local Residents If Program Highly Controversial
Public Meeting Of Local Residents
Town Council Decision
Removal, Alteration Or Permanent Installation Of Measures

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